REMARKS

The present invention address improvements in a relatively robust and competitive field of plasma display panels to improve both the light efficiency and the life of such products. As plasma display panels become larger, and the pixel cells become smaller, new problems are experienced that should be resolved to keep a competitive position.

It has been known that impurity gasses can be encapsulated within the sealed substrate of a plasma display panel even though efforts were specifically made to eliminate such impurity gasses in the production steps. Thus, different cycles of baking at elevated temperatures have been utilized but over the service life of the display panel, various impurity gasses can be released including carbides that can adhere to the surface of phosphorus layers and the front panel to impact upon the luminance of the display images.

The present invention uniquely recognizes this problem and provides a novel solution which is not recognized in the prior art. Thus, the present invention utilizes a photocatalyst that can be appropriately placed within the sealed display panel that when subject to light energy of various wavelengths can oxidize impurities such as carbides thereby minimize the depositing of carbon as a solid within the display image. For example, the carbon can be converted into a carbon monoxide or carbon dioxide gas.

Advantageously, a particular form of titanium dioxide or other photocatalyst material can be utilized in various areas within the display panel. For example, the titanium dioxide can be mixed with the dielectric layer for performing its <u>photocatalystic oxidization</u>. It also can further assist in reflecting visible light.

The present rejection is based on references that have used <u>white</u> titanium dioxide as a reflective layer. These prior art references, however, fail to recognize or utilize a particular form

of titanium dioxide and alternative photocatalystic components to address the issues of impurities over the life of the display panel.

Thus, one highly relevant inquiry in making an evaluation under 35 U.S.C. §103 is "[t]he relationship between the problem which the inventor. . . was attempting to solve and the problem to which any prior art reference is directed." Stanley Works v. McKinney Mfg. Co., 216 USPQ, 298, 304 (Del. D.C. 1981). Thus, in analyzing the prior art under Section 103 of the Act, we must clearly comprehend the problem addressed by the present inventors and that problem must be compared or contrasted, as the case may be, with the problems addressed by the prior art.

Pursuing further the "problem" analysis required under Section 103 of the U.S. Patent Act, the applicability of any reference against the claims of a pending U.S. patent application requires compliance with In re Gibbons, 100 U.S.P.Q. 298, where it is stated:

> In considering the questions of invention, it is <u>necessary</u> to determine whether or not the art relied upon contains <u>adequate direction</u> for the practice of the invention without resort to the involved application. (Emphasis added)

The Office Action rejected claims 1-9 and 20-28 as being completely anticipated under 35 USC § 102(b) by the Japanese Laid-Open Application 2000-011885.

To further assist the Examiner, enclosed herewith is a computer full translation of the Japanese Laid-Open Application. As can be seen on Page 3, "Means for Solving the Problem" suggests forming a white reflective membrane layer containing TiO_2, ZrO_2 and Al_2O_3. The desire to have titanium dioxide as a white ingredient is because it's reflection factor to wavelength "falls gradually in 400-800 nm", see Paragraph [0014] Thus, the principle teaching and the problem addressed in 1998 was providing a white reflecting film on a back panel

substrate to reflect light to the display surface side. Thus, a person of skill in this field would be directed to the most common form of white rutile TiO_2.

The Office Action also cited the Laid-Open Abstract 2000-011885 to reject as obvious claims 10-11 and 29-31. The Office Action contended that the particular "form of titanium dioxide would be within the general skill of a worker in the art and would be a matter of simple obvious design and choice."

Applicant respectfully traverses this contention in accordance with MPEP § 706.02(a). Since the reference does not recognize or even address the same problem resolved by our present invention, it is contended that the particular selection and choice of a dark color form of anatase TiO_2 let alone a titanium dioxide photocatalyst combination with nitrogen would not be obvious or desirable in view of this cited reference.

Finally, the Office Action asserted that claims 1 and 12-13 would also be anticipated by the *Tadaki et al.* US Patent Publication 2001/0054871.

The problem addressed by the *Tadaki et al.* reference was providing a filler with a refractive index different from that of a base and further of a size and ratio to balance a white reflective index versus power consumption, see Paragraph [0008]. Thus, a balancing of the "floating" capacity, the dielectric constant and the thickness of the dielectric layer was suggested and more particularly using a titania-coated mica as a filler, see Paragraph [0023] through [0027]. The desire to use flakes of silica coated with titania in a preferred application was to provide a sheet coated with a white reflective layer having the flakes orientated in a suitable direction and then subsequently pressed into the display area of the panel, see Paragraph [0029].

The *Tadaki et al.* reference is, like the Japanese Laid-Open Application 2000-011885, addressing again a particular issue of providing a white reflective layer to improve the luminance of the panel display within the panel display area.

Neither of these references recognize the photocatalystic advantages of solving the problem of the present invention. Likewise, neither of these references teach modifying a photocatalyst by a nitriding process to add nitrogen for altering a bandwidth to a desirable area within the visible spectrum.

Clearly, these references do not appreciate the interaction of ultraviolet rays with the photocatalyst for producing oxygen but rather are concerned with reflecting with a white material a broad bandwidth of 400 nm to 800 nm in the visible color spectrum. Our nitriding process extends the oxygen generating capacity for not only ultraviolet rays but also within the visible light spectrum.

The Office Action relied upon a contention of "matters of obvious design choice to a person of general skill in our field" as essence the only teaching to select a dark color titanium dioxide in an anatase form as set forth in our amended claim 1.

The underlining rational appears to be that it would be simply obvious to a person skilled in this field, seeking to only reflect light, to select a particular form of titanium dioxide that has a photocatalystic capability. Applicants respectfully traverse this contention.

> "Inherency 'may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'"
>
> *Continental Can Co. USA Inc. v. Monsanto Co.,* 20 USPQ2d 1746, 1749 (Fed. Cir. 1991).

It should be noted that when relying upon either the Japanese Laid-Open reference 2000-011885 and the *Tadaki et al.* US Publication as an anticipation that it is important that the cited material inherently provides a solution to the problem as set forth in our current claims. Reference can be made to our comparison chart Figure 5 wherein, for example, comparison samples 1 and 2 are utilized as a photocatalyst TiO_2 in a rutile form. As can be readily appreciated, our embodiment samples of the present invention produce considerable luminance intensity sustainability over a prolonged life cycle as a result of the oxidation characteristics of TiO_2 in anatase form (not a white reflective characteristic) so that it has the capacity to self clean our display panel over its extended life due to the interface with primarily the ultraviolet rays and when subject to a nitriding process, also the oxidation that could occur with visible light. Thus, a simple contention that a person of ordinary skill in the art would necessarily pick an appropriate form of a dark color titanium dioxide is not adequate to anticipate our present claims. A person who does not even recognize the problem is certainly not going to be directed to our titanium dioxide by the teachings of the two cited references as a photocatalyst of a particular form.

> "[A]nticipation by inherent disclosure is appropriate only when the reference discloses prior art that must *necessarily* include the unstated limitation. . . ."
>
> *Transclean Corp. v. Bridgewood Services, Inc.,* 290 F.3d 1364, 62 USPQ2d 1865 (Fed. Cir. 2002)

It is clear that neither of these references do anything more than address enhancing a white reflectance. They certainly do not describe our current patentable subject matter in any manner that would suggest that a person of ordinary skill in this field would recognize the advantages of our invention.

> "An anticipating reference must describe the patented subject matter with sufficient clarity and detail to establish that the subject matter existed in the prior art and that such existence would be recognized by persons of ordinary skill in the field of the invention. *See In re Spada*, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990); *Diversitech Corp. v. century steps, Inc.*, 850 F.2d 675, 678, 7 USPQ2d 1315, 1317 (Fed. Cir. 1988)."

While the Office Action contends that titanium dioxide in anatase form is well known for reflecting properties, it is clear that each of the cited references wish to have titanium dioxide with a highly white reflecting characteristic. As such, a person of ordinary skill in this field would be directed to titanium dioxide in the rutile form since this would be the white material desired by each of the cited references. Additionally, titanium dioxide in a rutile form is not as easily subject to a discoloration and is the most common and well known material between anatase, rutile and brookite forms of titanium dioxide. Each of these forms have a different structure with the anatase being the rarest form. See the attached disclosure on The Mineral Anatase.

As noted, the physical characteristic of titanium dioxide in an anatase form has colors brown to black or yellow and blue. Accordingly, applicant submits that the teachings of the cited references are not an anticipation and would not be obvious to a person of ordinary skill in this field.

These disclosures would suggest a white material as a reflecting film which would teach away from titanium dioxide in the anatase form. Additionally, the present invention is addressing an entirely different problem not recognized by any of the cited references. For these reasons, applicant submits that our present claims more than adequately distinguish over any combination of these cited references under 35 USC § 102 or 35 USC § 103.

Additionally, the Office Action did not address a nitride process to adjust an absorption edge of the photocatalyst and the characteristic of the photocatalyst then having nitrogen therein as set forth in our current claims. See, for example, claims 32-34.

Since our present invention is also concerned with a photocatalyst that will oxidize to decompose impurities, there is certainly no teaching of placing the photocatalyst within a sealed structure apart from an image display area. Each of the cited references are concerned with increasing reflectance light only in the image display area, not in a photocatalyst operation that can address impurity gasses released within the sealed structure.

Newly drafted claim 36 additionally addresses a plasma display panel utilizing a photocatalyst other than a titanium dioxide in anatase form. None of the references of record recognize the problem let alone suggest these particular materials for resolving the problems as set forth in new claims 36 and 37.

In view of the attached explanation as to the physical characteristics of titanium dioxide in anatase form, the application of a problem analysis to determine whether hindsight may have inadvertently been utilized in the rejection and the cited case law illustrating that none of the references have the capacity of inherently anticipating our present claims nor providing directions to a person of ordinary skill to select titanium dioxide in the anatase form to act as a photocatalyst, it is believed that the present invention is now allowable and early notification of

the same is requested. If the Examiner believes a telephone interview will assist in the prosecution of this matter the undersigned attorney would appreciate a telephone conference.

Very truly yours,

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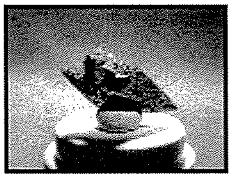

THE MINERAL ANATASE

- **Chemical Formula: TiO_2, Titanium Oxide**
- **Class: Oxides and Hydroxides**
- **Uses: A very minor ore of titanium and as mineral specimens.**
- **Specimens**

Anatase is a polymorph with two other minerals. The minerals **rutile** and **brookite** as well as anatase all have the same chemistry, TiO_2, but they have different structures. At higher temperatures, about 915 degrees Celsius, anatase will automatically revert to the rutile structure. Rutile is the more common and the more well known mineral of the three, while anatase is the rarest. Anatase shares many of the same or nearly the same properties as rutile such as luster, hardness and density. However due to structural differences anatase and rutile differ slightly in crystal habit and more distinctly in cleavage.

Anatase and rutile have the same symmetry, tetragonal 4/m 2/m 2/m, despite having different structures. In Rutile, the structure is based on octahedrons of titanium oxide which share two edges of the octahedron with other octahedrons and form chains. It is the chains themselves which are arranged into a four-fold symmetry. In anatase, the octahedrons share four edges hence the four fold axis.

Crystals of anatase are very distinctive and are not easily confused with any other mineral. They form the eight faced tetragonal dipyramids that come to sharp elongated points. The elongation is pronounced enough to distinguish this crystal form from octahedral crystals, but there is a similarity. In fact anatase is wrongly called *"octahedrite"* in spite of the difference in forms. Of course *"tetragonal dipyramidite"* does not sound right either!

Nice specimens of anatase are associated with quartz and are considered classics in the mineral world. The good luster, well formed crystal shape and interesting character make anatase a popular mineral for collectors.

PHYSICAL CHARACTERISTICS:

- **Color** is brown to black, also yellow and blue.
- **Luster** is adamantine to submetallic.
- **Transparency** crystals are opaque.
- **Crystal System** is tetragonal; 4/m 2/m 2/m
- **Crystal Habits** include the typical tetragonal dipyramids that come to sharp elongated terminations points. These crystals look like stretched out octahedrons.
- **Cleavage** is perfect in the basal direction and in four directions, pyramidal.

- **Fracture** is subconchoidal.
- **Hardness** is 5.5 - 6
- **Specific Gravity** is 3.8 - 3.9 (average for metallic minerals)
- **Streak** is white.
- **Other Characteristics:** Crystals are easily altered in nature and sometimes pitted.
- **Associated Minerals** include **brookite, rutile, quartz, feldspars, apatite, hematite, chlorite, micas, calcite** and **sphene**.
- **Notable Occurrences** include Somerville, Massachusetts and Gunnison Co., Colorado, USA; Tavistock, Devon, England; Austria; Diamantina District, Brazil; in the French Alps and at the Binnatal area of Switzerland.
- **Best Field Indicators** are crystal habit, luster, cleavage, density, streak, associations and locality.

PATENT ABSTRACTS OF JAPAN

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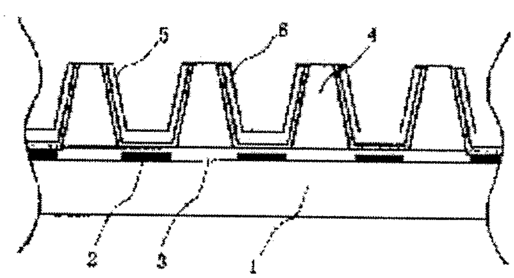
(54) GAS-DISCHARGE TYPE DISPLAY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To prevent the breakdown voltage failure and to improve the luminance by forming a reflecting film layer containing a white material over the sidewall surface of a bulkhead and the bottom surface between bulkheads so as to be in contact with a phosphor layer on a back substrate.



SOLUTION: A reflecting film layer 5 formed on the sidewalls of a bulkhead 4 and the bottom surface of a discharge space partitioned by the bulkheads 4 is covered with a phosphor layer 6. The reflecting film layer 5 is formed by thick film printing of a dielectric paste containing an inorganic component made of only a white material. In this way, light emitted by the phosphor by ultraviolet ray excitation caused by the discharge within the discharge space is prevented from being transmitted or absorbed by a glass substrate 1 or the sidewall surfaces of the bulkheads 4, and the light can be reflected to the front substrate side that is the display surface side. Thus, the loss by transmission or absorption

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can be prevented, and the emitting quantity to the display surface side can be improved by reflection to improve the luminance. Since address electrodes 2 are covered with a dielectric layer 3, the breakdown voltage can also be improved.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]
[Claim 1] The discharge-in-gases mold display characterized by preparing the reflective membrane layer containing a white ingredient in the fluorescent substance layer bottom so that the fluorescent substance layer formed in the tooth-back substrate may be touched in the discharge-in-gases mold display equipped with the front substrate and the tooth-back substrate.
[Claim 2] The discharge-in-gases mold display characterized by preparing a reflective membrane layer between the dielectric layer front face on the address electrode which has the septum which has the concave convex front face formed in the tooth-back substrate in the discharge-in-gases mold display equipped with the front substrate and the tooth-back substrate, and a concave convex front face, and a fluorescent substance layer.
[Claim 3] The discharge-in-gases mold display characterized by preparing a reflective membrane layer only in the part which touched the fluorescent substance layer in discharge cell space in the tooth-back substrate at the fluorescent substance layer bottom in the discharge-in-gases mold display equipped with the front substrate and the tooth-back substrate.
[Claim 4] The discharge-in-gases mold display characterized by forming said reflective membrane layer with the dielectric paste containing said white ingredient in claims 1 or 2 or three publications.
[Claim 5] It is the discharge-in-gases mold display characterized by being the **-strike by which, as for said dielectric paste, the mineral constituent was made only from the white ingredient in the claim 4 publication.
[Claim 6] The discharge-in-gases mold display characterized by forming a fluorescent substance layer with the fluorescent substance paste containing a white ingredient on a tooth-back substrate in the discharge-in-gases mold display equipped with the front substrate and the tooth-back substrate.
[Claim 7] The discharge-in-gases mold display characterized by forming a fluorescent substance layer by the sol gel coat containing a white ingredient on a tooth-back substrate in the discharge-in-gases mold display equipped with the front substrate and the tooth-back substrate.
[Claim 8] The discharge-in-gases mold display with which it is fine particles-like and said white ingredient is characterized by the particle size being granular or smaller than the particle size of a fluorescent substance in claim 6 or seven publications.
[Claim 9] It is the discharge-in-gases mold display characterized by said white ingredient being titanium oxide (TiO_2) in claims 1 or 6 or seven publications.
[Claim 10] The discharge-in-gases mold display characterized by forming a fluorescent substance layer and a reflective membrane layer in claim 1 or three publications with the film or sheet which has the two-layer structure of a fluorescent substance layer and a reflecting layer.
[Claim 11] The discharge-in-gases mold display to which a fluorescent substance layer and a reflective membrane layer are characterized by forming a fluorescent substance layer and a reflective membrane layer in claim 1 or three publications with the film or sheet formed one layer at a time, respectively.

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* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to discharge-in-gases mold displays, such as a plasma display.
[0002]
[Description of the Prior Art] The discharge-in-gases mold display represented by the plasma display displays by self-luminescence. For this reason, compared with the liquid crystal which is the same thin display, an angle of visibility is large and a display is legible. Moreover, it has the features that it is thinly lightweight and big-screen-izing is possible compared with the display by CRT (Cathod Ray Tube; Braun tube) etc. Taking advantage of these features, application expansion to indicating equipments, high definition televisions, etc. of an information terminal equipment, such as a personal computer, is advanced.
[0003] The above-mentioned plasma display is divided roughly into a direct-current drive mold (DC mold) and an alternating current drive mold (AC mold). Among these, its dependability, such as a life, improved the electrode by formation of the protective layer of the dielectric etc. while the plasma display of an alternating current drive mold had high brightness by the memory operation of a wrap dielectric layer. Thereby, it is put in practical use as a television receiver or a monitor.
[0004] Drawing 8 is the perspective view showing the structure of the plasma display of the alternating current drive mold put in practical use. In addition, in this drawing, in order to make structure intelligible, the front substrate 100 is separated from the tooth-back substrate 200, and is illustrated.
[0005] The front substrate 100 has the structure where the display electrode 600 which consists of transparence electrical conducting materials, such as ITO (Indium Tin Oxide) and tin oxide (SnO2), the bus electrode 700 which consists of low electrical resistance materials, such as silver, and copper, aluminum, the dielectric layer 800 which consists of a transparent insulating material, and the protective layer 900 which consists of ingredients, such as a magnesium oxide (MgO), were formed on the front-windshield substrate 400. Moreover, the tooth-back substrate 200 has structure which consists of the dielectric layer 1300 (however, not shown [this dielectric layer]) formed on the tooth-back glass substrate 500 so that a bus electrode, the address electrode 1000 using the same low electrical resistance materials, and it might be covered, a septum 1100, and a fluorescent substance layer 1200. And the discharge space field 300 is formed between the front substrate 100 and the tooth-back substrate 200 by making the front substrate 100 and the tooth-back substrate 200 rival so that the display electrode 600 and the address electrode 1000 may intersect perpendicularly. In addition, although illustration is not carried out, sealing of the lamination is carried out by the low melting glass applied to the substrate periphery, and the mixed gas of Ne and Xe etc. is usually enclosed after exhaust air by the exhaust hole opened in the tooth-back substrate side.
[0006] Address discharge is generated and a predetermined discharge cel is made to generate a main stroke in this alternating current drive type of plasma display by impressing alternating voltage between one pair of display electrodes 600 prepared in the front substrate 100, and impressing an electrical

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potential difference between the address electrode 1000 prepared in the tooth-back substrate 200, and the display electrode 600. Color display is performed by making green [which were distinguished by different color by each discharge cel with / the red and green], and the blue fluorescent substance layer 1200 emit light by the ultraviolet rays generated in the case of this main stroke. In addition, the space surrounded by two septa 1100 on one pair of display electrodes 600 of the front substrate 100 and the tooth-back substrate 200 serves as a discharge space field of one cel, and it becomes 1 pixel in accordance with three cels to which red, green, and the blue fluorescent substance layer 1200 were applied, respectively.
[0007] Moreover, the light of the red who emitted light by the fluorescent substance layer 1200 by 300 in a discharge space field, green, and blue will penetrate the front substrate 100, and will reach a view ** person's eyes. Therefore, it is required that the light transmittance of ingredients, such as glass in the front substrate 100, and a transparent electrode, a dielectric, should be as much as possible high. On the other hand, the ingredient of the glass in the tooth-back substrate 200 or a dielectric does not need to penetrate light, and it is required that light should be reflected rather. For this reason, that in which the dielectric layer 1300 on the tooth-back substrate 200 contained the high white ingredient of the rate of a light reflex is used. Furthermore, luminescence which goes in the direction of a tooth-back substrate from the inside of discharge space is reflected by the reflecting mirror surface layer by forming a reflecting mirror surface layer and an electric insulation layer between the glass on the tooth-back substrate 200, and the address electrode 1000, and there is a method of raising brightness. This conventional example is shown in JP,6-295674,A.
[0008] Moreover, JP,50-100965,A, JP,4-47639,A, JP,9-213215,A, and JP,9-231910,A are mentioned as a conventional technique related in addition to this.
[0009]
[Problem(s) to be Solved by the Invention] although utilization is carried out for the discharge-in-gases mold display represented by the plasma display -- it is also -- it is mentioned as a technical problem that luminous efficiency is still bad as compared with displays, such as CRT, and brightness is low.
[0010] As one means to solve this, by containing a white ingredient as a filler, luminescence by the side of a tooth-back substrate is reflected in the dielectric layer formed in order to cover the address electrode of a tooth-back substrate and to secure withstand voltage, and the technique of raising brightness is in it. However, the dielectric layer on the address electrode which contains the filler of a white ingredient in invention-in-this-application persons furthering researches and developments of such a discharge-in-gases mold display panel in for the improvement in a reflection factor clarified the trouble of lifting-coming to be easy of a poor proof pressure. That is, by the filler in a dielectric, since it becomes easy to generate a void, the impression on the front face of a dielectric, etc., when discharge is caused between the display electrode by the side of a front substrate, and the address electrode by the side of a tooth-back substrate, a spark will be started from these voids and impression parts, and it will be disconnected.

[0011] By on the other hand preparing the electric insulation layer for insulating the reflecting mirror surface layer by a metal thin film etc., this layer, and an address electrode between the glass on a tooth-back substrate, and an address electrode as one of the means of other to solve the above-mentioned technical problem, a reflection factor is improved and there is the technique of attaining high brightness-ization. Also in this technique, if conversely thick [if a reflecting mirror surface layer and an address inter-electrode electric insulation layer are thin, it will lifting-come to be easy of a poor proof pressure, and], since the distance of discharge space and a reflecting mirror surface layer will become long, there is a problem that a reflection factor falls by absorption, dispersion, etc. Furthermore, in a display panel, each brightness of the red at the time of indicating the whole surface by white, green, and blue is shown in drawing 7 . As shown in this drawing, it turns out that a big difference is in brightness by the three primary colors, and brightness is falling in order of red, green, and blue. Thus, when a difference is in brightness in red, green, and blue, exact color specification becomes impossible.
[0012] The place which it was made in order that this invention might solve the trouble which the above conventional techniques have, and is made into the purpose is to offer a discharge-in-gases display with

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which brightness becomes uniform in red, green, and blue while raising brightness, preventing a poor proof pressure.
[0013]
[Means for Solving the Problem] This invention is TiO2 between the bases pinched by the fluorescent substance layer on a tooth-back substrate, and the side-attachment-wall side of a septum and a septum and a septum. It is forming the reflective membrane layer containing the white ingredient of ZrO2 and aluminum2O3 grade, and the above-mentioned purpose is attained.
[0014] ** -- by considering as a configuration [like], since [of the fluorescent substance layer which emits light] the reflective film is immediately formed in directly under, loss by transparency, absorption, etc. of the luminescence light to a tooth-back plate or the direction of a septum can be suppressed to the minimum, a reflection factor improves, and high brightness-ization of a panel is attained. Moreover, it is TiO2 especially as a white ingredient. It is TiO2 when it uses. As for the reflection factor to wavelength, it turns out that wavelength falls gradually in 400-800nm. That is, to the three primary colors in drawing 7 , a reflection factor becomes high in the order of blue, green, and red. Therefore, TiO2 It not only raises brightness, but by using the reflective film to contain, it can make red, green, and the luminescence brightness of a blue fluorescent substance into homogeneity.
[0015] Moreover, since the white filler in the dielectric layer on an address electrode becomes unnecessary and it stops generating a void, the impression on the front face of a dielectric, etc., a poor proof pressure can be prevented. Moreover, brightness can be further raised by combining changing the shape of forming the reflective membrane layer in this invention, and surface type of the base pinched by the wall surface of a septum, and the septum, and raising the surface area. In addition, formation of a reflective membrane layer can be performed by package spreading by the same approach and same spray as spreading of a fluorescent substance etc., and a very simple process can realize the improvement in brightness and the improvement in a proof pressure in a panel. It is possible to raise brightness further by combining to expand formation of a reflective membrane layer and the surface area of the part which applies a reflective membrane layer and a fluorescent substance layer moreover.
[0016] Since a septum part is covered with this invention by the reflective membrane layer, the reinforcement of a septum improves further again. The chip of the septum by the vibration the time of the assembly of the front substrate which had become a problem in the process by this conventionally, and a tooth-back substrate, and after panel-izing can be reduced. That is, the cel defect at the time of panel lighting by the chip of a septum can be prevented.
[0017]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail using a drawing. Drawing 1 is the sectional view of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 1st operation gestalt of this invention.
[0018] In drawing 1 , the dielectric layer formed as a substrate 1 and an electrode 2 covered in the substrate (glass substrate) which uses 1 for a tooth-back substrate, the electrode (address electrode) in which 2 was formed on the substrate 1, and 3, and 4 are the septa formed in order to divide discharge space for every cel. Moreover, they are the reflective membrane layer by which 5 was formed in the side-attachment-wall side of a septum 4, and the base of discharge space divided by the septum 4, and the fluorescent substance layer formed as the reflective membrane layer covered in 6. In addition, when a front substrate and a tooth-back substrate assembled and panel-ize both, they define the direction which does not serve as a front substrate and the screen in the direction which penetrates the luminescence light by the fluorescent substance from discharge space, and serves as the screen as a tooth-back substrate.
[0019] As shown in drawing 1 , the electrode 2 on a substrate 1 is formed by patterning by thin film formation and photograph RISO, such as printing or a spatter, and vacuum evaporationo, and the etching process. Moreover, in order to protect an electrode 2, while forming a dielectric layer 3 by printing, vacuum evaporationo, sol gel coating, etc., a septum 4 is formed with printing, sandblasting after front printing and regist patterning, etc.
[0020] And a mineral constituent forms the reflective membrane layer 5 by thin film formation of the

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white ingredient by the thick film screen printing by the dielectric paste made only from the white ingredient, the sol gel coating of a white ingredient, vacuum evaporationo, etc. For example, a white ingredient is titanium oxide (TiO2), a zirconium dioxide (ZrO2), or an aluminum oxide (aluminum 2O3), and the reflective membrane layer 5 is formed by the thickness of about 1-20 micrometers.
[0021] Moreover, formation of the reflective membrane layer 5 can also be formed with the sheet and film of the reflective membrane layer containing a white ingredient. For example, a reflective film sheet is stuck all over a tooth-back substrate after forming a septum 4. And the reflective membrane layer 5 can be formed by pressurizing and heating the metal mold corresponding to a septum configuration after alignment, and, for example, sticking and joining a reflective film sheet to the base surrounded by the septum side and the septum, and the septum. Furthermore, if the film or sheet which has the two-layer structure of the reflective membrane layer 5 and the fluorescent substance layer 6 is used, the reflective membrane layer 5 and the fluorescent substance layer 6 can be collectively formed by the same approach. However, it is necessary to use the sheet or film beforehand colored by red, green, and blue in the fluorescent substance layer corresponding to spacing of a screen field and a septum in this case. Or after sticking and joining each fluorescent substance sheet or film of green [to which the reflective film sheet was attached / the red and green], and blue by the above-mentioned approach, it is necessary to repeat the process which removes an unnecessary part according to FOTORISO, an etching process, etc. 3 times.
[0022] In addition, since the reflective membrane layer 5 is in discharge space, it is formed with an insulating ingredient so that discharge may not be barred. Then, red, green, and the blue fluorescent substance layer 6 are formed in the predetermined field used as a viewing area by printing etc., respectively so that the reflective membrane layer 5 may be covered.
[0023] Thus, by forming the reflective membrane layer 5 in contact with the fluorescent substance layer 6, the light in which the fluorescent substance by the ultraviolet-rays excitation generated in the discharge in discharge space emitted light can prevent being penetrated and absorbed to a substrate 1 and septum 4 side-attachment-wall side side, and can reflect the luminescence light in the front substrate side which is a screen side. Thereby, while preventing loss by transparency or absorption, the amount of luminescence by the side of the screen can be increased by reflection, and brightness can be raised. Moreover, since the address electrode 2 is covered with the dielectric layer 3, its pressure-proofing also improves.
[0024] Drawing 2 is the sectional view of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 2nd operation gestalt of this invention.
[0025] Also in this operation gestalt, an electrode 2 and a dielectric layer 3 are formed on a substrate 1 like the 1st operation gestalt shown in drawing 1 . Next, as shown in drawing 2 , a septum 4 is formed so that a front face may become concave convex. For example, like the 1st operation gestalt, after forming a septum 4 with printing, sandblasting, etc., it becomes concave convex again by enlarging particle size of sandblasting and carrying out blasting of the septum front face. In addition, it is necessary to carry out blasting on conditions which a dielectric layer 3 does not expose so that a septum ingredient may remain also in a base in the case of the 1st sandblasting that is,.
[0026] Then, the reflective membrane layer 5 is formed by the dielectric paste containing a white ingredient, or the sol gel coat like the 1st operation gestalt. Furthermore, red, green, and the blue fluorescent substance layer 6 are formed in the predetermined field used as a viewing area by printing etc. on it, respectively.
[0027] ** -- in this operation gestalt which takes a configuration [like], the reflective membrane layer 5 prevents transparency of the light to the direction of a tooth-back substrate, and the direction of a septum, dispersion, absorption, etc., and reflects light in a screen side -- in addition, since the surface area of the reflective membrane layer 5 and the fluorescent substance layer 6 is expanded, the amount of luminescence and the amount of reflection of a fluorescent substance by ultraviolet-rays cold increase. Therefore, it becomes possible to improve brightness further.
[0028] Drawing 3 is the sectional view on the way of manufacture of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 3rd operation gestalt of this invention.

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[0029] Also in this operation gestalt, an electrode 2 and a dielectric layer 3 are formed like the 1st and 2nd operation gestalt on the tooth-back substrate 1. And after forming a septum 4 with printing or sandblasting, a dielectric paste is applied by spray injection etc. Thereby, it distributes on a septum side face, a cell space base, etc., and a dielectric paste serves as a projection 7 as shown in drawing 3 . By calcinating this, the front face for a septum and a cell space bottom surface part can be made concave convex like the 2nd operation gestalt shown in drawing 2 .
[0030] Then, the reflective membrane layer 5 and the fluorescent substance layer 6 are formed like the 1st and 2nd operation gestalt. Thereby, the increment in the amount of luminescence accompanying reduction of loss of the light by existence of a reflective membrane layer which emitted light, and the surface area expansion by the projection 7 is realizable like the 2nd operation gestalt of drawing 2 . That is, brightness can be raised.
[0031] Drawing 4 is the sectional view of a tooth-back substrate in which the fluorescent substance layer containing the white ingredient of the plasma display (discharge-in-gases mold display) concerning the 4th operation gestalt of this invention was formed.
[0032] As shown in drawing 4 , an electrode 2, a dielectric layer 3, and a septum 4 are formed on a substrate 1 with this operation gestalt as well as the 1st operation gestalt of drawing 1 . Next, the fluorescent substance layer 6 is formed by printing the red containing a white ingredient, green, and a blue fluorescent substance paste in a predetermined location, respectively. For example, the thickness of the fluorescent substance layer 6 is 5-10 micrometers. This thickness is a proper value in consideration of taking the largest possible discharge space and securing [both] fluorescent substance thickness required in order to raise brightness.
[0033] With this operation gestalt, as shown in the expansion part in drawing 4 , white ingredient particle 5a is intermingled in fluorescent substance particle 6a. For this reason, the luminescence light of the fluorescent substance by the ultraviolet-rays excitation generated at the time of discharge is reflected by white ingredient particle 5a intermingled in the fluorescent substance layer 6, and only the part of brightness of the light reflected in the screen, i.e., front substrate, side improves while it can reduce the light to the direction of a tooth-back substrate. Furthermore, it is made for the content of the white ingredient in red, green, and a blue fluorescent substance paste to increase in order of blue, green, and red. That is, in drawing 7 , if brightness makes [many] content of a white ingredient at the order of low blue, green, and red, since brightness will improve in order of blue, green, and red under the effect of reflective, as total, the brightness of red, green, and blue is equalized and brightness can be equalized.
[0034] Drawing 5 is the sectional view of a tooth-back substrate in which the fluorescent substance layer containing the white ingredient of the plasma display (discharge-in-gases mold display) concerning the 5th operation gestalt of this invention was formed.
[0035] As shown in drawing 5 , an electrode 2, a dielectric layer 3, and a septum 4 are formed on a substrate 1 with this operation gestalt as well as the 1st operation gestalt of drawing 1 . Next, the fluorescent substance layer 6 is formed by printing the red containing a white ingredient, green, and a blue fluorescent substance paste in a predetermined location, respectively. However, in the case of this operation gestalt, white ingredient particle 5a intermingled in the fluorescent substance layer 6 makes particle size small to fluorescent substance particle 6a. For example, the particle diameter of fluorescent substance particle 6a is [a white ingredient particle] 1 micrometer or less in about 3-6 micrometers.
[0036] Thereby, as shown in the expansion part in drawing 5 , the direction of white ingredient particle 5a with small particle diameter comes to turn a laminating down after printing. That is, it will be in the condition of having separated into two-layer [of a fluorescent substance layer and a reflective membrane layer], and will become almost the same as the structure in the 1st operation gestalt of drawing 1 . Therefore, brightness improves by reflecting luminescence of a fluorescent substance into the fluorescent substance layer 6 in drawing 4 still more efficiently than the condition that fluorescent substance particle 6a and white ingredient particle 5a were intermingled.
[0037] In addition, you may make it form the fluorescent substance layer 6 by the sol gel coating of the fluophor ingredient containing a white ingredient in the 4th and 5th operation gestalt.
[0038] Drawing 6 is drawing having shown the field which forms a reflective membrane layer in each

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operation gestalt of this invention, and (a) of drawing 6 is the plan seen from the front substrate side which is a screen side at the time of combining a tooth-back substrate and a front substrate. Moreover, although (b) of drawing 6 is the plan seen from the front substrate side which is a corresponding (a), and screen side, in order to make drawing intelligible, it shows the bus electrode 8 and transparent electrode 9 on a front substrate with the thin line. [of drawing 6]

[0039] In (b) of drawing 6 , the slash section is the field which forms the reflective film 5. This slash section field is the wall surface of the septum 4 in a discharge cell space field, and a surrounded base field of a septum and a septum. First, sequential formation is carried out by the technique of having mentioned above the electrode 2, the dielectric layer 3, and the septum 4 on the tooth-back substrate 1. (Next, the white ingredient 2, for example, TiO, After applying the reflective membrane layer 5 to contain only in a discharge cell space field by printing, red, green, and the blue fluorescent substance layer 6 are formed in the predetermined field used as a viewing area by printing etc., respectively.) Thereby, the luminescence light of the fluorescent substance to the direction of a tooth-back substrate and the direction of a septum reflects only in a discharge space field. since [that is,] the luminescence light which leaked outside the discharge space field does not have the reflective film -- transparency -- it will be absorbed and scattered about. Therefore, the brightness in a discharge space field not only improves, but contrast improves by producing a difference in brightness a reflected part of luminescence light in a discharge space field and the other field. In this case, for example, if only septum 4 all or the crowning of a septum 4 is formed with a paste etc. including a black ingredient, contrast can be raised further.

[0040]

[Effect of the Invention] As mentioned above, according to this invention, a fluorescent substance layer is touched, and the discharge-in-gases display whose brightness improves can be offered by having a reflective membrane layer containing a white ingredient, preventing a poor proof pressure. Moreover, red, green, and a discharge-in-gases display with which brightness becomes uniform in a blue fluorescent substance can be offered.

[Translation done.]

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* NOTICES *

TECHNICAL FIELD

[Field of the Invention] This invention relates to discharge-in-gases mold displays, such as a plasma display.

[Translation done.]

PRIOR ART

[Description of the Prior Art] The discharge-in-gases mold display represented by the plasma display displays by self-luminescence. For this reason, compared with the liquid crystal which is the same thin display, an angle of visibility is large and a display is legible. Moreover, it has the features that it is thinly lightweight and big-screen-izing is possible compared with the display by CRT (Cathod Ray Tube; Braun tube) etc. Taking advantage of these features, application expansion to indicating equipments, high definition televisions, etc. of an information terminal equipment, such as a personal computer, is advanced.
[0003] The above-mentioned plasma display is divided roughly into a direct-current drive mold (DC mold) and an alternating current drive mold (AC mold). Among these, its dependability, such as a life, improved the electrode by formation of the protective layer of the dielectric etc. while the plasma display of an alternating current drive mold had high brightness by the memory operation of a wrap dielectric layer. Thereby, it is put in practical use as a television receiver or a monitor.
[0004] Drawing 8 is the perspective view showing the structure of the plasma display of the alternating current drive mold put in practical use. In addition, in this drawing, in order to make structure intelligible, the front substrate 100 is separated from the tooth-back substrate 200, and is illustrated.
[0005] The front substrate 100 has the structure where the display electrode 600 which consists of transparence electrical conducting materials, such as ITO (Indium Tin Oxide) and tin oxide (SnO2), the bus electrode 700 which consists of low electrical resistance materials, such as silver, and copper, aluminum, the dielectric layer 800 which consists of a transparent insulating material, and the protective layer 900 which consists of ingredients, such as a magnesium oxide (MgO), were formed on the front-windshield substrate 400. Moreover, the tooth-back substrate 200 has structure which consists of the dielectric layer 1300 (however, not shown [this dielectric layer]) formed on the tooth-back glass substrate 500 so that a bus electrode, the address electrode 1000 using the same low electrical resistance materials, and it might be covered, a septum 1100, and a fluorescent substance layer 1200. And the discharge space field 300 is formed between the front substrate 100 and the tooth-back substrate 200 by making the front substrate 100 and the tooth-back substrate 200 rival so that the display electrode 600 and the address electrode 1000 may intersect perpendicularly. In addition, although illustration is not carried out, sealing of the lamination is carried out by the low melting glass applied to the substrate periphery, and the mixed gas of Ne and Xe etc. is usually enclosed after exhaust air by the exhaust hole opened in the tooth-back substrate side.
[0006] Address discharge is generated and a predetermined discharge cel is made to generate a main stroke in this alternating current drive type of plasma display by impressing alternating voltage between one pair of display electrodes 600 prepared in the front substrate 100, and impressing an electrical potential difference between the address electrode 1000 prepared in the tooth-back substrate 200, and the display electrode 600. Color display is performed by making green [which were distinguished by different color by each discharge cel with / the red and green], and the blue fluorescent substance layer 1200 emit light by the ultraviolet rays generated in the case of this main stroke. In addition, the space surrounded by two septa 1100 on one pair of display electrodes 600 of the front substrate 100 and the

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tooth-back substrate 200 serves as a discharge space field of one cel, and it becomes 1 pixel in accordance with three cels to which red, green, and the blue fluorescent substance layer 1200 were applied, respectively.
[0007] Moreover, the light of the red who emitted light by the fluorescent substance layer 1200 by 300 in a discharge space field, green, and blue will penetrate the front substrate 100, and will reach a view ** person's eyes. Therefore, it is required that the light transmittance of ingredients, such as glass in the front substrate 100, and a transparent electrode, a dielectric, should be as much as possible high. On the other hand, the ingredient of the glass in the tooth-back substrate 200 or a dielectric does not need to penetrate light, and it is required that light should be reflected rather. For this reason, that in which the dielectric layer 1300 on the tooth-back substrate 200 contained the high white ingredient of the rate of a light reflex is used. Furthermore, luminescence which goes in the direction of a tooth-back substrate from the inside of discharge space is reflected by the reflecting mirror surface layer by forming a reflecting mirror surface layer and an electric insulation layer between the glass on the tooth-back substrate 200, and the address electrode 1000, and there is a method of raising brightness. This conventional example is shown in JP,6-295674,A.
[0008] Moreover, JP,50-100965,A, JP,4-47639,A, JP,9-213215,A, and JP,9-231910,A are mentioned as a conventional technique related in addition to this.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, according to this invention, a fluorescent substance layer is touched, and the discharge-in-gases display whose brightness improves can be offered by having a reflective membrane layer containing a white ingredient, preventing a poor proof pressure. Moreover, red, green, and a discharge-in-gases display with which brightness becomes uniform in a blue fluorescent substance can be offered.

[Translation done.]

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* NOTICES *

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] although utilization is carried out for the discharge-in-gases mold display represented by the plasma display -- it is also -- it is mentioned as a technical problem that luminous efficiency is still bad as compared with displays, such as CRT, and brightness is low.
[0010] As one means to solve this, by containing a white ingredient as a filler, luminescence by the side of a tooth-back substrate is reflected in the dielectric layer formed in order to cover the address electrode of a tooth-back substrate and to secure withstand voltage, and the technique of raising brightness is in it. However, the dielectric layer on the address electrode which contains the filler of a white ingredient in invention-in-this-application persons furthering researches and developments of such a discharge-in-gases mold display panel in for the improvement in a reflection factor clarified the trouble of lifting-coming to be easy of a poor proof pressure. That is, by the filler in a dielectric, since it becomes easy to generate a void, the impression on the front face of a dielectric, etc., when discharge is caused between the display electrode by the side of a front substrate, and the address electrode by the side of a tooth-back substrate, a spark will be started from these voids and impression parts, and it will be disconnected.

[0011] By on the other hand preparing the electric insulation layer for insulating the reflecting mirror surface layer by a metal thin film etc., this layer, and an address electrode between the glass on a tooth-back substrate, and an address electrode as one of the means of other to solve the above-mentioned technical problem, a reflection factor is improved and there is the technique of attaining high brightness-ization. Also in this technique, if conversely thick [if a reflecting mirror surface layer and an address inter-electrode electric insulation layer are thin, it will lifting-come to be easy of a poor proof pressure, and], since the distance of discharge space and a reflecting mirror surface layer will become long, there is a problem that a reflection factor falls by absorption, dispersion, etc. Furthermore, in a display panel, each brightness of the red at the time of indicating the whole surface by white, green, and blue is shown in drawing 7 . As shown in this drawing, it turns out that a big difference is in brightness by the three primary colors, and brightness is falling in order of red, green, and blue. Thus, when a difference is in brightness in red, green, and blue, exact color specification becomes impossible.
[0012] The place which it was made in order that this invention might solve the trouble which the above conventional techniques have, and is made into the purpose is to offer a discharge-in-gases display with which brightness becomes uniform in red, green, and blue while raising brightness, preventing a poor proof pressure.

[Translation done.]

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MEANS

[Means for Solving the Problem] This invention is TiO2 between the bases pinched by the fluorescent substance layer on a tooth-back substrate, and the side-attachment-wall side of a septum and a septum and a septum. It is forming the reflective membrane layer containing the white ingredient of ZrO2 and aluminum2O3 grade, and the above-mentioned purpose is attained.
[0014] ** -- by considering as a configuration [like], since [of the fluorescent substance layer which emits light] the reflective film is immediately formed in directly under, loss by transparency, absorption, etc. of the luminescence light to a tooth-back plate or the direction of a septum can be suppressed to the minimum, a reflection factor improves, and high brightness-ization of a panel is attained. Moreover, it is TiO2 especially as a white ingredient. It is TiO2 when it uses. As for the reflection factor to wavelength, it turns out that wavelength falls gradually in 400-800nm. That is, to the three primary colors in drawing 7 , a reflection factor becomes high in the order of blue, green, and red. Therefore, TiO2 It not only raises brightness, but by using the reflective film to contain, it can make red, green, and the luminescence brightness of a blue fluorescent substance into homogeneity.
[0015] Moreover, since the white filler in the dielectric layer on an address electrode becomes unnecessary and it stops generating a void, the impression on the front face of a dielectric, etc., a poor proof pressure can be prevented. Moreover, brightness can be further raised by combining changing the shape of forming the reflective membrane layer in this invention, and surface type of the base pinched by the wall surface of a septum, and the septum, and raising the surface area. In addition, formation of a reflective membrane layer can be performed by package spreading by the same approach and same spray as spreading of a fluorescent substance etc., and a very simple process can realize the improvement in brightness and the improvement in a proof pressure in a panel. It is possible to raise brightness further by combining to expand formation of a reflective membrane layer and the surface area of the part which applies a reflective membrane layer and a fluorescent substance layer moreover.
[0016] Since a septum part is covered with this invention by the reflective membrane layer, the reinforcement of a septum improves further again. The chip of the septum by the vibration the time of the assembly of the front substrate which had become a problem in the process by this conventionally, and a tooth-back substrate, and after panel-izing can be reduced. That is, the cel defect at the time of panel lighting by the chip of a septum can be prevented.
[0017]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail using a drawing. Drawing 1 is the sectional view of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 1st operation gestalt of this invention.
[0018] In drawing 1 , the dielectric layer formed as a substrate 1 and an electrode 2 covered in the substrate (glass substrate) which uses 1 for a tooth-back substrate, the electrode (address electrode) in which 2 was formed on the substrate 1, and 3, and 4 are the septa formed in order to divide discharge space for every cel. Moreover, they are the reflective membrane layer by which 5 was formed in the side-attachment-wall side of a septum 4, and the base of discharge space divided by the septum 4, and the fluorescent substance layer formed as the reflective membrane layer covered in 6. In addition, when

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a front substrate and a tooth-back substrate assembled and panel-ize both, they define the direction which does not serve as a front substrate and the screen in the direction which penetrates the luminescence light by the fluorescent substance from discharge space, and serves as the screen as a tooth-back substrate.
[0019] As shown in drawing 1 , the electrode 2 on a substrate 1 is formed by patterning by thin film formation and photograph RISO, such as printing or a spatter, and vacuum evaporationo, and the etching process. Moreover, in order to protect an electrode 2, while forming a dielectric layer 3 by printing, vacuum evaporationo, sol gel coating, etc., a septum 4 is formed with printing, sandblasting after front printing and regist patterning, etc.
[0020] And a mineral constituent forms the reflective membrane layer 5 by thin film formation of the white ingredient by the thick film screen printing by the dielectric paste made only from the white ingredient, the sol gel coating of a white ingredient, vacuum evaporationo, etc. For example, a white ingredient is titanium oxide (TiO2), a zirconium dioxide (ZrO2), or an aluminum oxide (aluminum 2O3), and the reflective membrane layer 5 is formed by the thickness of about 1-20 micrometers.
[0021] Moreover, formation of the reflective membrane layer 5 can also be formed with the sheet and film of the reflective membrane layer containing a white ingredient. For example, a reflective film sheet is stuck all over a tooth-back substrate after forming a septum 4. And the reflective membrane layer 5 can be formed by pressurizing and heating the metal mold corresponding to a septum configuration after alignment, and, for example, sticking and joining a reflective film sheet to the base surrounded by the septum side and the septum, and the septum. Furthermore, if the film or sheet which has the two-layer structure of the reflective membrane layer 5 and the fluorescent substance layer 6 is used, the reflective membrane layer 5 and the fluorescent substance layer 6 can be collectively formed by the same approach. However, it is necessary to use the sheet or film beforehand colored by red, green, and blue in the fluorescent substance layer corresponding to spacing of a screen field and a septum in this case. Or after sticking and joining each fluorescent substance sheet or film of green [to which the reflective film sheet was attached / the red and green], and blue by the above-mentioned approach, it is necessary to repeat the process which removes an unnecessary part according to FOTORISO, an etching process, etc. 3 times.
[0022] In addition, since the reflective membrane layer 5 is in discharge space, it is formed with an insulating ingredient so that discharge may not be barred. Then, red, green, and the blue fluorescent substance layer 6 are formed in the predetermined field used as a viewing area by printing etc., respectively so that the reflective membrane layer 5 may be covered.
[0023] Thus, by forming the reflective membrane layer 5 in contact with the fluorescent substance layer 6, the light in which the fluorescent substance by the ultraviolet-rays excitation generated in the discharge in discharge space emitted light can prevent being penetrated and absorbed to a substrate 1 and septum 4 side-attachment-wall side side, and can reflect the luminescence light in the front substrate side which is a screen side. Thereby, while preventing loss by transparency or absorption, the amount of luminescence by the side of the screen can be increased by reflection, and brightness can be raised. Moreover, since the address electrode 2 is covered with the dielectric layer 3, its pressure-proofing also improves.
[0024] Drawing 2 is the sectional view of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 2nd operation gestalt of this invention.
[0025] Also in this operation gestalt, an electrode 2 and a dielectric layer 3 are formed on a substrate 1 like the 1st operation gestalt shown in drawing 1 . Next, as shown in drawing 2 , a septum 4 is formed so that a front face may become concave convex. For example, like the 1st operation gestalt, after forming a septum 4 with printing, sandblasting, etc., it becomes concave convex again by enlarging particle size of sandblasting and carrying out blasting of the septum front face. In addition, it is necessary to carry out blasting on conditions which a dielectric layer 3 does not expose so that a septum ingredient may remain also in a base in the case of the 1st sandblasting that is,.
[0026] Then, the reflective membrane layer 5 is formed by the dielectric paste containing a white ingredient, or the sol gel coat like the 1st operation gestalt. Furthermore, red, green, and the blue

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fluorescent substance layer 6 are formed in the predetermined field used as a viewing area by printing etc. on it, respectively.
[0027] ** -- in this operation gestalt which takes a configuration [like], the reflective membrane layer 5 prevents transparency of the light to the direction of a tooth-back substrate, and the direction of a septum, dispersion, absorption, etc., and reflects light in a screen side -- in addition, since the surface area of the reflective membrane layer 5 and the fluorescent substance layer 6 is expanded, the amount of luminescence and the amount of reflection of a fluorescent substance by ultraviolet-rays cold increase. Therefore, it becomes possible to improve brightness further.
[0028] Drawing 3 is the sectional view on the way of manufacture of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 3rd operation gestalt of this invention.
[0029] Also in this operation gestalt, an electrode 2 and a dielectric layer 3 are formed like the 1st and 2nd operation gestalt on the tooth-back substrate 1. And after forming a septum 4 with printing or sandblasting, a dielectric paste is applied by spray injection etc. Thereby, it distributes on a septum side face, a cell space base, etc., and a dielectric paste serves as a projection 7 as shown in drawing 3 . By calcinating this, the front face for a septum and a cell space bottom surface part can be made concave convex like the 2nd operation gestalt shown in drawing 2 .
[0030] Then, the reflective membrane layer 5 and the fluorescent substance layer 6 are formed like the 1st and 2nd operation gestalt. Thereby, the increment in the amount of luminescence accompanying reduction of loss of the light by existence of a reflective membrane layer which emitted light, and the surface area expansion by the projection 7 is realizable like the 2nd operation gestalt of drawing 2 . That is, brightness can be raised.
[0031] Drawing 4 is the sectional view of a tooth-back substrate in which the fluorescent substance layer containing the white ingredient of the plasma display (discharge-in-gases mold display) concerning the 4th operation gestalt of this invention was formed.
[0032] As shown in drawing 4 , an electrode 2, a dielectric layer 3, and a septum 4 are formed on a substrate 1 with this operation gestalt as well as the 1st operation gestalt of drawing 1 . Next, the fluorescent substance layer 6 is formed by printing the red containing a white ingredient, green, and a blue fluorescent substance paste in a predetermined location, respectively. For example, the thickness of the fluorescent substance layer 6 is 5-10 micrometers. This thickness is a proper value in consideration of taking the largest possible discharge space and securing [both] fluorescent substance thickness required in order to raise brightness.
[0033] With this operation gestalt, as shown in the expansion part in drawing 4 , white ingredient particle 5a is intermingled in fluorescent substance particle 6a. For this reason, the luminescence light of the fluorescent substance by the ultraviolet-rays excitation generated at the time of discharge is reflected by white ingredient particle 5a intermingled in the fluorescent substance layer 6, and only the part of brightness of the light reflected in the screen, i.e., front substrate, side improves while it can reduce the light to the direction of a tooth-back substrate. Furthermore, it is made for the content of the white ingredient in red, green, and a blue fluorescent substance paste to increase in order of blue, green, and red. That is, in drawing 7 , if brightness makes [many] content of a white ingredient at the order of low blue, green, and red, since brightness will improve in order of blue, green, and red under the effect of reflective, as total, the brightness of red, green, and blue is equalized and brightness can be equalized.
[0034] Drawing 5 is the sectional view of a tooth-back substrate in which the fluorescent substance layer containing the white ingredient of the plasma display (discharge-in-gases mold display) concerning the 5th operation gestalt of this invention was formed.
[0035] As shown in drawing 5 , an electrode 2, a dielectric layer 3, and a septum 4 are formed on a substrate 1 with this operation gestalt as well as the 1st operation gestalt of drawing 1 . Next, the fluorescent substance layer 6 is formed by printing the red containing a white ingredient, green, and a blue fluorescent substance paste in a predetermined location, respectively. However, in the case of this operation gestalt, white ingredient particle 5a intermingled in the fluorescent substance layer 6 makes particle size small to fluorescent substance particle 6a. For example, the particle diameter of fluorescent substance particle 6a is [a white ingredient particle] 1 micrometer or less in about 3-6 micrometers.

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[0036] Thereby, as shown in the expansion part in drawing 5 , the direction of white ingredient particle 5a with small particle diameter comes to turn a laminating down after printing. That is, it will be in the condition of having separated into two-layer [of a fluorescent substance layer and a reflective membrane layer], and will become almost the same as the structure in the 1st operation gestalt of drawing 1 . Therefore, brightness improves by reflecting luminescence of a fluorescent substance into the fluorescent substance layer 6 in drawing 4 still more efficiently than the condition that fluorescent substance particle 6a and white ingredient particle 5a were intermingled.
[0037] In addition, you may make it form the fluorescent substance layer 6 by the sol gel coating of the fluophor ingredient containing a white ingredient in the 4th and 5th operation gestalt.
[0038] Drawing 6 is drawing having shown the field which forms a reflective membrane layer in each operation gestalt of this invention, and (a) of drawing 6 is the plan seen from the front substrate side which is a screen side at the time of combining a tooth-back substrate and a front substrate. Moreover, although (b) of drawing 6 is the plan seen from the front substrate side which is a corresponding (a), and screen side, in order to make drawing intelligible, it shows the bus electrode 8 and transparent electrode 9 on a front substrate with the thin line. [of drawing 6]
[0039] In (b) of drawing 6 , the slash section is the field which forms the reflective film 5. This slash section field is the wall surface of the septum 4 in a discharge cell space field, and a surrounded base field of a septum and a septum. First, sequential formation is carried out by the technique of having mentioned above the electrode 2, the dielectric layer 3, and the septum 4 on the tooth-back substrate 1. (Next, the white ingredient 2, for example, TiO, After applying the reflective membrane layer 5 to contain only in a discharge cell space field by printing, red, green, and the blue fluorescent substance layer 6 are formed in the predetermined field used as a viewing area by printing etc., respectively.) Thereby, the luminescence light of the fluorescent substance to the direction of a tooth-back substrate and the direction of a septum reflects only in a discharge space field. since [that is,] the luminescence light which leaked outside the discharge space field does not have the reflective film -- transparency -- it will be absorbed and scattered about. Therefore, the brightness in a discharge space field not only improves, but contrast improves by producing a difference in brightness a reflected part of luminescence light in a discharge space field and the other field. In this case, for example, if only septum 4 all or the crowning of a septum 4 is formed with a paste etc. including a black ingredient, contrast can be raised further.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 1st operation gestalt of this invention.
[Drawing 2] It is the sectional view of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 2nd operation gestalt of this invention.
[Drawing 3] It is the sectional view on the way of manufacture of the tooth-back substrate of the plasma display (discharge-in-gases mold display) concerning the 3rd operation gestalt of this invention.
[Drawing 4] It is the sectional view of a tooth-back substrate in which the fluorescent substance layer containing the white ingredient of the plasma display (discharge-in-gases mold display) concerning the 4th operation gestalt of this invention was formed.
[Drawing 5] It is the sectional view of a tooth-back substrate in which the fluorescent substance layer containing the white ingredient of the plasma display (discharge-in-gases mold display) concerning the 5th operation gestalt of this invention was formed.
[Drawing 6] In each operation gestalt of this invention, it is the explanatory view showing the field which forms a reflective membrane layer.
[Drawing 7] They are the red at the time of indicating the whole surface by the conventional technique by white, green, and the graphical representation showing blue brightness.
[Drawing 8] It is the perspective view showing the configuration of the plasma display (discharge-in-gases mold display) of an alternating current drive mold.
[Description of Notations]
1 Substrate Used for Tooth-Back Substrate (Glass Substrate)
2 Electrode (Address Electrode)
3 Dielectric Layer
4 Septum
5 Reflective Membrane Layer
5a Reflective film particle
6 Fluorescent Substance Layer
6a Fluorescent substance particle
7 Projection
8 Bus Electrode
9 Transparent Electrode

[Translation done.]

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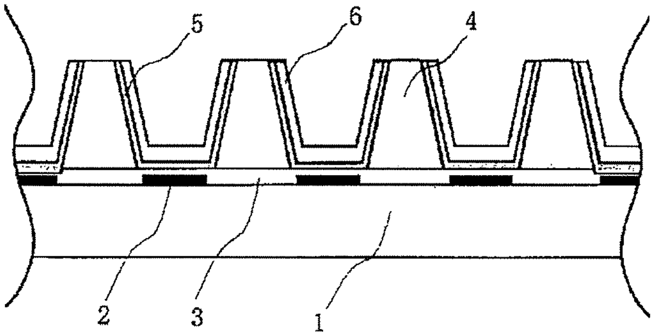
Drawing selection drawing 1

図 1



[Translation done.]

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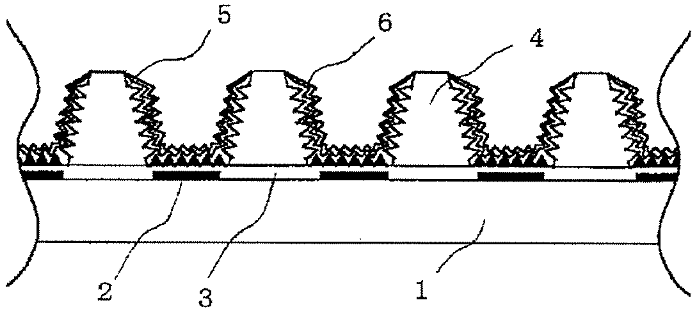
Drawing selection drawing 2

図 2



[Translation done.]

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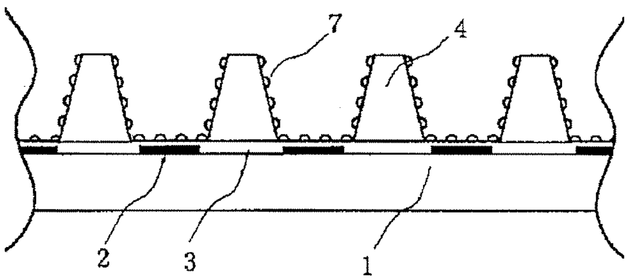
Drawing selection drawing 3

図 3



[Translation done.]

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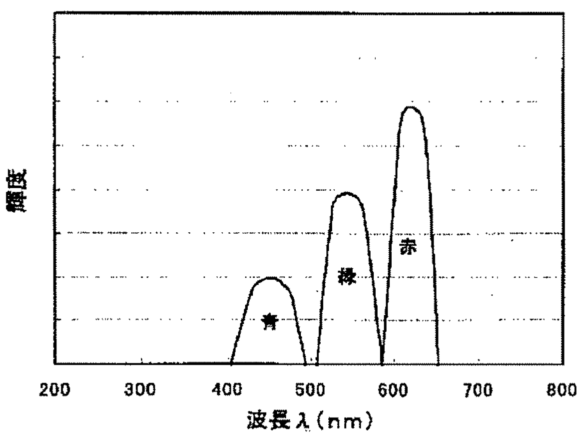
Drawing selection drawing 7

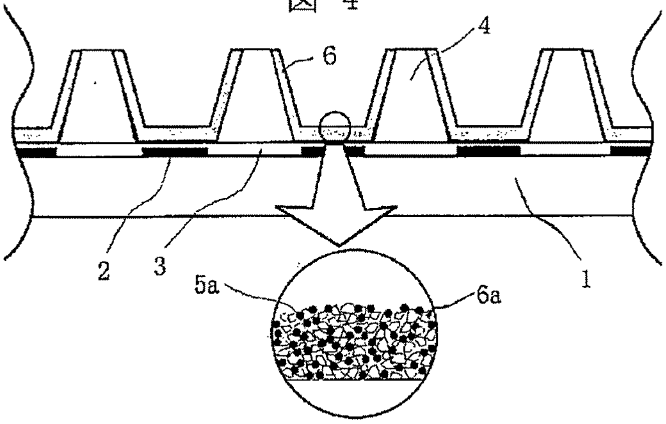
図 7



[Translation done.]

Drawing selection drawing 4

図 4



[Translation done.]

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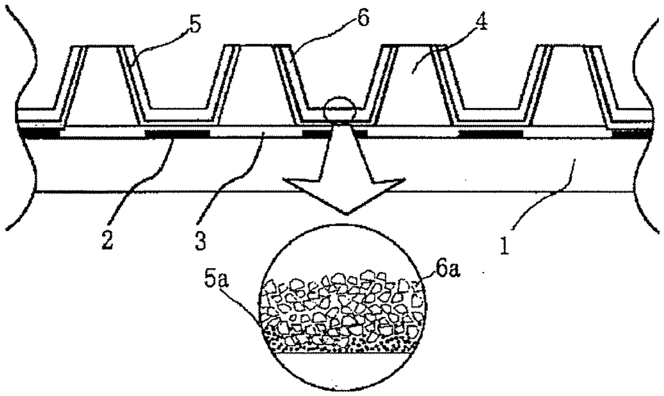
Drawing selection drawing 5

図 5



[Translation done.]

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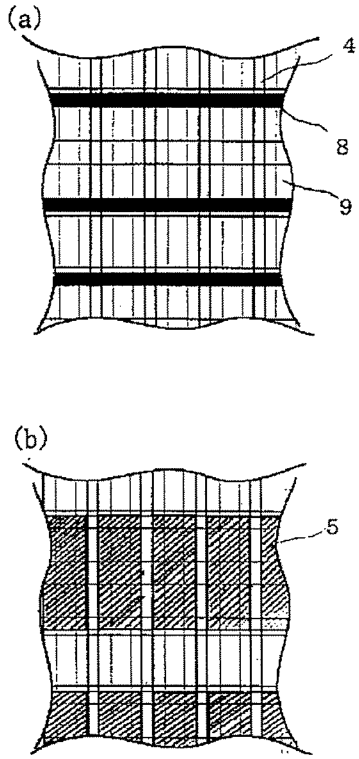
Drawing selection drawing 6

図 6



[Translation done.]

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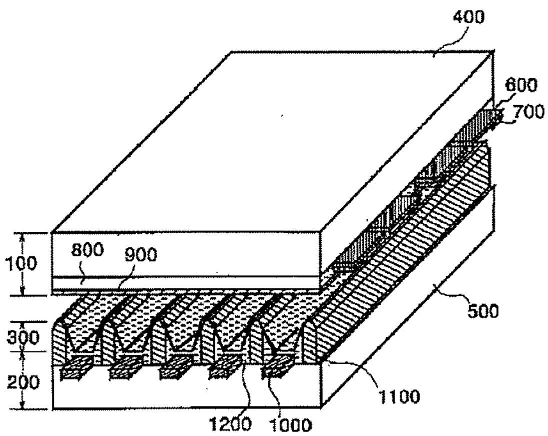
Drawing selection drawing 8

図 8



[Translation done.]

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JP 2000-011885

DERWENT-ACC-NO: 2000-152389

DERWENT-WEEK: 200015

TITLE: Reflecting coating of **plasma display** device - has reflecting film layer with **titanium oxide** which is provided at bottom of **fluorescent** layer

PATENT-ASSIGNEE: HITACHI LTD[HITA]

PRIORITY-DATA: 1998JP-0173382 (June 19, 1998)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
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APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP2000011885A	N/A	1998JP-0173382	June 19, 1998

INT-CL (IPC): H01J011/02

ABSTRACTED-PUB-NO: JP2000011885A

BASIC-ABSTRACT:

NOVELTY - A **fluorescent** layer (6) is formed on the substrate (1) reflecting film (5) with **titanium oxide** is provided on the bottom of the **fluorescent** layer
such that film contacts back surface of the **fluorescent** layers.

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USE - For gas discharge type displays device such as **plasma display**.

ADVANTAGE - The brightness is improved as reflecting film contacts with fluorescent layer. DESCRIPTION OF DRAWING(S) - The figure shows the sectional
view of **plasma display** device. (1) Substrate; (5) Reflecting film; (6) Fluorescent layer.

CHOSEN-DRAWING: Dwg.1/8

TITLE-TERMS: REFLECT COATING **PLASMA DISPLAY** DEVICE REFLECT FILM LAYER **TITANIUM**
OXIDE BOTTOM **FLUORESCENT** LAYER

DERWENT-CLASS: V05

EPI-CODES: V05-A01A3; V05-A01D1E;

SECONDARY-ACC-NO:
Non-CPI Secondary Accession Numbers: N2000-113375

51

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(51)Int.Cl.⁷	識別記号	F I	テーマコード゛(参考)
H01J　11/02		H01J　11/02　B	5C040

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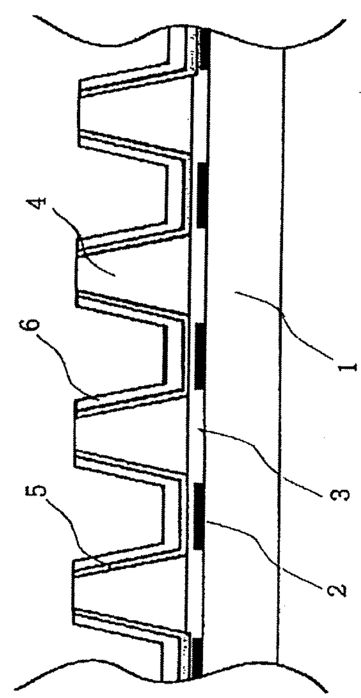
(54)【発明の名称】　ガス放電型表示装置

(57)【要約】
【課題】　耐圧不良を防止しつつ、輝度を向上させるとともに、赤、緑、青において輝度が均一となるような、ガス放電表示装置を提供すること。
【解決手段】　背面基板上の蛍光体層に接した、隔壁の側壁面および隔壁と隔壁とに挟まれた底面に、白色材料を含有した反射膜層を形成する。さらに、白色材料として、例えばＴｉO_2 を用いる。

図1



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